

Association between Constipation and Sleep Quality among Hospitalized Chronic Kidney Disease Patients

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Abstract

Background: Constipation and poor sleep quality are most symptoms among patients with chronic kidney disease that affect many individuals worldwide with increasing alarmingly. **The research aimed to** assess the association between constipation and sleep quality among hospitalized chronic kidney disease patients. **Setting:** The current research was applied at the inpatient kidney disease department at the Kidney and Urology Hospital, which affiliated to Minia University. **Subjects of the research:** Purposive sample of 187 patients with chronic kidney disease. **Tools of data collection:** Bio-Demographic characteristics, Rome IV diagnostic criteria for functional constipation, the Patient Assessment of Constipation-Symptoms questionnaire and Pittsburgh Sleep Quality Index **Results:** There was a statistically significant positive correlation between progression of CKD stages with increasing severity of constipation symptoms, and poor sleep quality. **Conclusion:** There was a significant association between constipation and sleep quality among patients with CKD. **Recommendation:** Further investigations regarding epidemiology and prognosis of constipation and sleep quality to evaluate the most effective and safe profiles of different therapeutic techniques for them, and analysis their potential advantages on subsequent results of CKD.

Keywords: Association, Chronic Kidney Disease, Constipation, Sleep quality.

Introduction

Chronic Kidney Disease (CKD) is a significant disorder that impact around 12% of the individuals worldwide including personnel of all ethnicities and ages. It is a disorder where kidney function gradually declines over time, and it is associated with symptoms of nausea, decreased appetite, itching, exhaustion, pulmonary edema, arrhythmia, and awareness disruption due to accumulated bodily fluids, wastes, and toxins. (Ike, et al., 2020). According to the Centers for Disease Control and Prevention, CKD affects thirty-seven million individuals in the United State. It is worth noting that 90% of individuals with CKD are unaware of their states (Wilson, et al., 2021). It is described as either a decreased rate of glomerular filtration (GFR) less than sixty mL/min/1.73 m²) or obvious signs of kidney problems as an abnormal pathology or increase albumin in urine for at least three months, the deviation as well as staging of CKD are depend on the reasons, on the albuminuria level, as well as on GFR (Tsai, et al., 2021). CKD is strongly connected with the risk of certain cardiovascular

problems conditions and vascular calcification, patients with CKD are more likely to experience atherosclerosis-related cardiovascular issues as myocardial infarction as well as stroke. When renal functions decline, patients with CKD become higher vulnerable to non-atherosclerotic cardiovascular event (Noels & Jankowski, 2020). Both constipation and sleep quality disruptions are also common among chronic medical conditions such as CKD that are connected with more serious health-regarding quality of life (QOL). (Sumida, et al., 2020). Constipation is a most gastrointestinal problem that impact many individuals throughout the world in the clinical settings and during their stay in the hospital, some individuals who never had gastrointestinal issues may developed constipation, while others who already had such condition frequently experience worsening symptoms (Aziz et al., 2020). Constipation could be either primary (functional) or secondary (non-functional) due to some illness or medications. However, these 2 types could be overlap, making it limited to be distinguish. (Bharucha & Wald, 2019).

Individuals who suffering from constipation reported a variety of symptoms which adversely affected their QOL, as they included straining via defecation, present of firm stools, sense of insufficient evacuation and/or anorectal blockage, use of manual maneuvers to promote defecation, and decreased frequency of assessment less than 3 times per week **(Ramos, et al., 2021)**. Constipation-related risk factors among patients with CKD are included among the underlying pathophysiological abnormalities of the disease. Several interconnected causes had been hypothesized by reducing gastrointestinal motility, brain-gut-kidney axis dysregulation, barrier function, inflammation, as well as changes in the gut microbiota **(Ike, et al., 2020)**. The high prevalence of constipation among patients with CKD have been linked to increase uremic toxins and change gut flora, both of which are frequently observed among patients with CKD. Approximately thirty percent of the general population personnel suffer from constipation via their lifespan. As it had been observed to be more common among hospitalized patients with CKD, especially who are at the end stages, than among the general population **(Sumida, et al.,2020)**.

Constipation is commonly related to poor sleep quality because short bedtimes may alter gastrointestinal physiology's circadian cycles, so, rebalance sleep phase proportions, and increase nocturnal waking frequency, lead to abnormally which enhanced the basal colonic motility and contraction during sleep period. Sleep constitutes one of the most vital functions of human beings, and it had an impact on the physical and mental health as well. **(Kulpatcharapong et al., 2020)**.The definition of sleep lacks a universally accepted and understanding within the academic literature. Rather, it is commonly characterized as a person's overall degree of contentment with their experience of sleep, which is primarily determined by key factors such as the amount of sleep obtained, the degree of sleep continuity, and the sensation of being revitalized upon awakening **(Crivello, et al., 2021)**. Sleep quality and quantity are important factors in supporting health. Poor sleep quality had been associated with an increased risk of cardiac disease, cancer, metabolic disorders, and all-cause mortality. Moreover, prolonged poor sleep had been linked to cognitive

function impairment, neurological illnesses, a lower immune system, and an increased risk of falls **(Angehrn et al., 2020)**. Additionally, patients with CKD could have multi sleep quality issues related to utilization of drugs, anxiety, depression, pain, and itching that have an effect on the sleep quality itself, such as the length of time needed to fall asleep, stay asleep, and wake up. Breathing problems associated to kidney illness could reduce the quality of sleep. Patients with CKD their sleep quality are nearly eighty-percent among most of the cases **(Natale, et al., 2019)**.

Significant of the study:

Chronic Kidney Disease is a degenerative disorder that impact more than ten-percent of the global personnel, amounting to higher than 800 million individual worldwide **(Elshahat, et al., 2020)**. According to the global illness concern, CKD will be the fifth major cause of mortality by 2040. It affects one out of every ten persons worldwide, with a frequency of 24.7% among patients with hypertension and 16.6% among patients with diabetes, resulting in considerable increasing in morbidity and mortality rate **(Racha, et al., 2020)**. In Egypt the broad Burden of CKD Collaboration calculated that there were 7.1 million personnel diagnosed as patients with CKD **(Frag & El-Sayed, 2021)**. One of the biggest health problems in Egypt is CKD, which affects thirteen percent of the adult individual and leads to high morbidity, death, and healthcare expenses as well as a lower QOL. It continued to be the 16th most common reason for early mortality **(Nagib, Afify, Amin, & Allam, 2020)**. More patients with CKD had been observed to experience constipation with range from 1.6 to 90.3% in a recent evaluation of 19 studies. Additionally, patients with CKD have a high incidence of several sleep quality disorders, which is estimated about 14% to 57% among patients with CKD. **(Tiwari & Parajuli, 2021)**. Among patients with non-dialysis CKD, it estimates that sleep apnea, insomnia, excessive daytime sleepiness, and restless leg syndrome were 38% (21%–70%), 33.3% (22.2%–46.1%), 22% (18%–28%), and 9.9% (5.4%–17.5%), respectively **(Ruszkowski et al., 2021)**, **(Huang et al., 2019)**. Therefore, understanding the association

between constipation and sleep quality among non-dialysis CKD patients help in developing better strategies to manage their conditions.

Operational definition:

Functional or primary constipation (FC): includes group of functional abnormalities that show up persistent difficult, infrequent, or incomplete evacuation that is persistent. According to the pathophysiology, patients with FC are divided into three subgroups: those with normal colonic transit (NCT), those with slow colonic transit (SCT), as well as those with functional defecatory problems (Moezi, et al., 2018), (Hwang, et al., 2021).

Non-functional constipation (Non-FC) or secondary constipation: are mainly related to systemic or organic diseases, or medications. For example: endocrine diseases, metabolic disorders, electrolyte imbalance, medications, and neurological diseases (Yamamoto, et al., 2021).

Sleep quality is known as an individual's self-satisfaction with all shapes of the experience sleep that can be calculated through the next variables: efficiency of sleep, latency of sleep, wake after sleep onset (WASO), as well as architecture sleep measures (Nelson, Davis & Corbett 2022).

Aim of the research:

The present study aimed to assess the association between constipation and sleep quality among hospitalized chronic kidney disease patients.

Research questions:

Is there a correlation between constipation and sleep quality among hospitalized chronic kidney disease patients?

What is the level of constipation and sleep quality among hospitalized chronic kidney disease patients?

Design of the Research:

A descriptive correlational research design was utilized in the study.

Setting of the Research:

The current study was conducted at inpatient kidney disease department at the Kidney and Urology Hospital, which is affiliated to Minia University. The department consists of 2 rooms: one for males and the second for females. The total capacity was 14 beds.

Sample:

A Purposive sample of 187 chronic kidney disease patients was allocated to the current research. The sample size was calculated according to Slovin's formula, as follows:

$$n = N / (1 + Ne^2), \text{ (Slovin, 1960)}$$

Whereas:

n = size of the sample

N = total personnel

e = desired error margin

$$n = 350 / [1 + (350)(0.05)^2] = 187$$

The Inclusion criteria:

- Inpatients.
- Adults (more than 18 yrs. old).
- Diagnosed with CKD.

Exclusion criteria:

- Ongoing dialysis.
- Kidney transplantation history
- Visual or cognitive impairments that prevent the patient from responding to the questionnaire.
- Serious illness undergoing immediate medical attention.

Data collection tools:

The study data were gathered through four tools:

First tool: Bio-Demographic characteristics:

It was developed by the researchers to gather demographic and medical data, which included three parts:

Part I: Patients' demographic characteristics that including age, gender, and living condition.

Part II: Medical data It included data about the co-morbidities, medications, laxatives, and body mass index (BMI).

Part III: Clinical parameters of the total population study.

It involved data about CKD stages and laboratory investigations, including (Creatinine, Urea, Hemoglobin (HB), Na, K).

Second tool: Rome IV diagnostic criteria for functional constipation

1	<ul style="list-style-type: none"> a. Straining during more than 25% of defecations b. Lumpy or hard stools (the Bristol Stool Form Scale 1-2) more than 25% of defecations c. Sensation of incomplete evacuation more than 25% of defecations d. Sensations of anorectal obstruction/blockage more than 25% of defecations e. Manual maneuvers to facilitate more than 25% of defecations (e.g., digital evacuation, support of the pelvic floor) f. Fewer than 3 spontaneous bowel movements per week
2	Loose stools are rarely present without the use of laxatives
3	Insufficient criteria for irritable bowel syndrome

Third Tool: Patient Assessment for Constipation-Symptoms (PAC-SYM) questionnaire:

It is a self-reported questionnaire designed by Frank in 1999, which composed twelve items. Each item inquired about specific symptoms that patients might experience. The patients were then asked to score the intensity of each symptom during the previous two weeks on a 5-point Likert scale (0–4; absent to very severe). (Abdullah et al., 2019; Frank et al 1999).

Scoring system:

The items were additionally classified into three domains: abdominal symptoms (one to four question), rectal symptoms (five to seven question), and stool symptoms (eight to twelve question). The load of the symptoms was then determined using the mean score. A total PAC-SYM score ranges from zero to forty-eight with a low score meaning fewer symptoms as well as low severity with values ranging from zero to four (zero equal

The Rome IV diagnostic criteria were designed in an attempt to enhance the diagnosis of constipation as well as are most utilizing in clinical setting as well as research. Rome IV criteria cover the most important symptoms of constipation. It described by the present of at least 2 of the following medical manifestations during the 3 months prior to the assessment interview (Ikee et al., 2019):

"symptom absent," one equal "mild," two equal "moderate," three equal "severe," as well as four equal "extremely severe").

Fourth tool: Pittsburgh Sleep Quality Index (PSQI)

It is a self-rated questionnaire called the PSQI measures various aspects of sleep quality over the course of a month. It is one of the most widely used sleep surveys and was created by academic's staff at the University of Pittsburgh. The questionnaire included nineteen items with seven component scores, which including daytime dysfunction, habitual sleep efficiency, subjective sleep quality, sleep latency, and duration (Chiu & Hsu, 2016; Mollayeva et al., 2015; Buysse et al., 1989).

Scoring system:

Each element received a score ranging from zero meaning (no difficulty) to three meaning (severe difficulty), as well as the sum of the sleep component scores yields a final score, ranging from zero to twenty-one, with a higher score (known as the global score)

meaning poorer sleep quality. A global score more than five indicated that poorer sleep quality.

The tools Validity and Reliability:

Validity

A five-person panel of experts in the fields of medical-surgical nursing, critical care nursing, as well as psychiatric and mental health nursing revised the research instruments' content validity to evaluate the clarity, viability, and usefulness of the tools.

Reliability

The reliability of the tools was evaluated through using an Alpha Cronbach test, and they were found to be highly reliable, with a score of 0.96 for the Patient evaluation of Constipation-Symptoms (PAC-SYM) questionnaire, 0.87 for the Bristol Stool Form Scale, as well as 0.92 for the Pittsburgh Sleep Quality Index (PSQI).

Ethical Consideration

All formal permits letters were given from the proper authorities to conduct this study. The research was approved by the Minia University Nursing Faculty's Ethics Committee after reviewing the study protocol. There was no risk for study participants during conducting the research. Every participant who took part signed a free and informed consent form after they were informed about, the study's nature, aim, protocol, and advantages. Also they were informed that they had the freedom to leave the study at any moment without giving a reason. Each subject's anonymity and confidentiality were protected by encrypting all data and safeguarding the collected data. Plagiarism was avoided, and intellectual property rights were maintained.

Pilot Study:

It was conducted on ten percent of the total sample (nineteen participants). It was conducted to evaluate the instruments' applicability, clarity, the viability of fieldwork, and any potential challenges the researcher would face that might obstruct data gathering.

Also, to estimate time needed to fill in the data collecting tools. There were no changes made. So, pilot study sample was included in the main study sample.

Study fieldwork

Study field work included preparatory and implementation phases.

Preparatory phase: -

Before data were—collected, the researchers visited the inpatient unit for kidney disease at the Kidney and Urology Hospital 2 days every week starting from 9 a.m. to 12 p.m., to coordinate and formulate the plan for patient's recruitment until the intended sample size was reached. This phase assisted in guiding, planning, and developing the research procedure, in addition to obtain the formal written agreement that was reached a month before the trial was conducted. Data collection was performed along nine months from the starting of January 2021 to the end of September 2021.

Implementation phase: -

Participants were recruited to the current research during their stay in the inpatient unit at kidney disease department, the researchers started by introducing them-selves and discuss the purpose as well as nature of the study to every participant individually, then the participants who agreed to participate in the current study gave their verbal approval to the researchers., in a private setting, the researchers established face-to-face meeting with the participants for data collection using the fourth data collection tools, as well as the patient's hospital profile sheet through two visits with each patient for about 30 to 45 minutes per each session. Additionally, BMI was measured and computed using the formula [weight (in kilograms) / height (in meters squared)]. To determine the weight; the patient was advised to stand on a digital scale wearing little clothing and without shoes. Height was measured using an SECA 213 portable stadiometer. Normal BMI = 18.5-24.9 kg/M², Overweight BMI = 25.0-29.9 kg/M², Obesity

BMI = 30.0-39.9 kg/M2 and Extreme obesity BMI = 40.0 kg/M2.

Rome IV diagnostic criteria for functional constipation and PAC-SYM questionnaire were explained during data collection to each participant in a simple Arabic language to be easily understood and then completed by the researchers, the participants were requested to rate their sleep quality by using PSQI.

Statistical Analysis:

Statistical Package for Social Science (SPSS) version 24 was used to arrange, classify, and analyze the collected data. For qualitative and quantitative variables, respectively, the mean and standard deviations of the data were reported using descriptive statistics. The Chi-square test was used to examine the relationship between two categorical variables. The Pearson correlation test was used to determine the correlation coefficient, and a statistically significant difference was considered when the p-value was less than or equal to 0.05.

Results

Table (1) revealed that the mean age score of the studied participants was 49.2 ± 17.9 years old and 64.7 % were females and 84% of them lived with family. Also, it explored that 43.3 % of studied participants were hypertensive. 48.1% of them were taking more than one type of drug. Regarding laxatives, it was found that 75.4% was taking laxatives, and 63.1% of them taking only one type of laxatives during the study period. Moreover, 48.7% of them are overweight.

Figure (1) Illustrated that (59.9%) of studied participants were non-functional constipation while, (40.1 %) of them had functional constipation regarding to Rome criteria for diagnosis of functional constipation

Figure (2) Illustrated that 16 % of studied participants had mild symptoms of constipation and 64.2% had moderate symptoms of constipation while (19.8%) of them had severe symptoms of constipation according to PAC-SYM.

Table (2) Displayed the subscale of PSQI as follows, sleep duration had the highest score (2.39 ± 0.642), followed by sleep latency (2.04 ± 0.603), then habitual sleep efficiency (2.01 ± 0.939), and subjective sleep quality (1.70 ± 0.456), in addition to, the mean score of global PQSI among studied participants was (12.22 ± 3.60).

Table (3) Represented that, there is a statistically significant positive correlation between bio-demographic characteristics of the studied patients with the severe symptoms of constipation (PAC-SYM), and poor sleep quality (PSQI).

Table (4) Demonstrated that, there is a statistically significant positive correlation between high laboratory investigations with severe symptoms of constipation (PAC-SYM), and poor sleep quality PSQI.

Table (5) Clarified that, there is a statistical significant positive correlation between progression of CKD stages with severe constipation symptoms (PAC-SYM), and poor quality of sleep (PSQI).

Table (6) Showed a statistically significant positive correlation between increasing the severity of constipation symptoms (PAC-SYM) with poor quality of sleep (PSQI).

Table (7) Reflected that, there is a statistically significant positive correlation between short sleep duration with severe constipation symptoms PAC-SYM and progression of CKD stages among the study participants.

Table (1): Distribution of the studied participants regarding their Bio-demographic Characteristics (n=187)

Bio-demographic data	Study (n=30)	
	No.	%
Age / Years		
18 < 40	53	28.4
40 < 60	61	32.6
≤ 60	73	39
Mean ± SD	49.2 ± 17.9	
Gender		
Male	66	35.3
Female	121	64.7
Living condition		
Living with family	180	96.3
Living alone	7	3.7
Co-morbidities:		
Diabetes	23	12.3
Hypertension	81	43.4
Hyperlipidemia	16	8.6
Cardiovascular disease	7	3.7
Inflammatory bowel disease	7	3.7
More than one disease	53	28.3
Medications		
Analgesics	23	12.3
Opioids	8	4.3
Calcium supplement	14	7.5
Calcium channel blockers	15	8
Diuretics	29	15.5
Iron supplement	8	4.3
More than one drug	90	48.1
Dose the patient takes laxatives		
Yes	141	75.4
No	46	24.6
BMI		
< 18.5 "underweight"	28	15
18.5-24.9 "normal weight"	61	32.6
25-29.9 "overweight"	91	48.7
> 30 "morbid obesity"	7	3.7
Mean ± SD	23.5 ± 4.11	

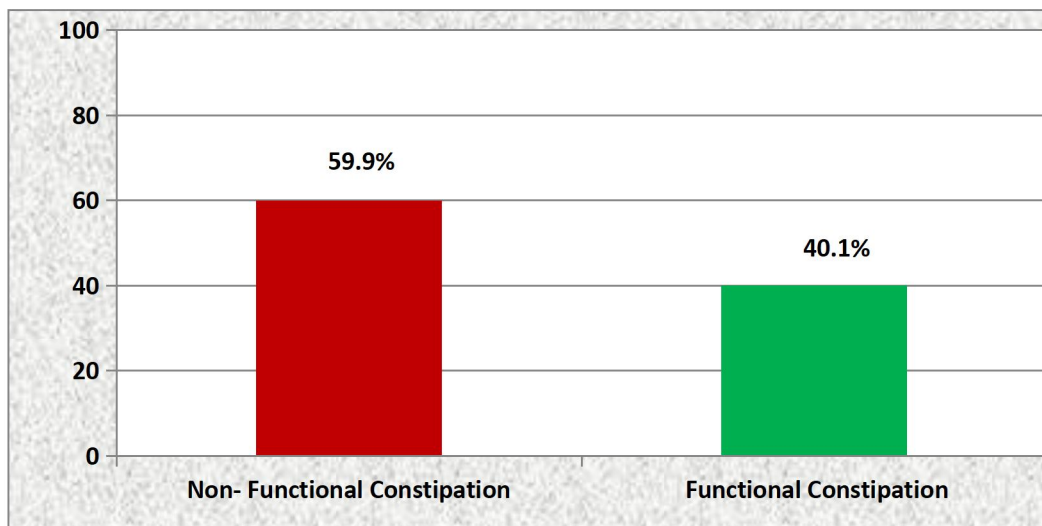


Figure (1): Distribution of the Studied Participants Regarding to Rome Diagnostic Criteria for Functional Constipation (n=187)

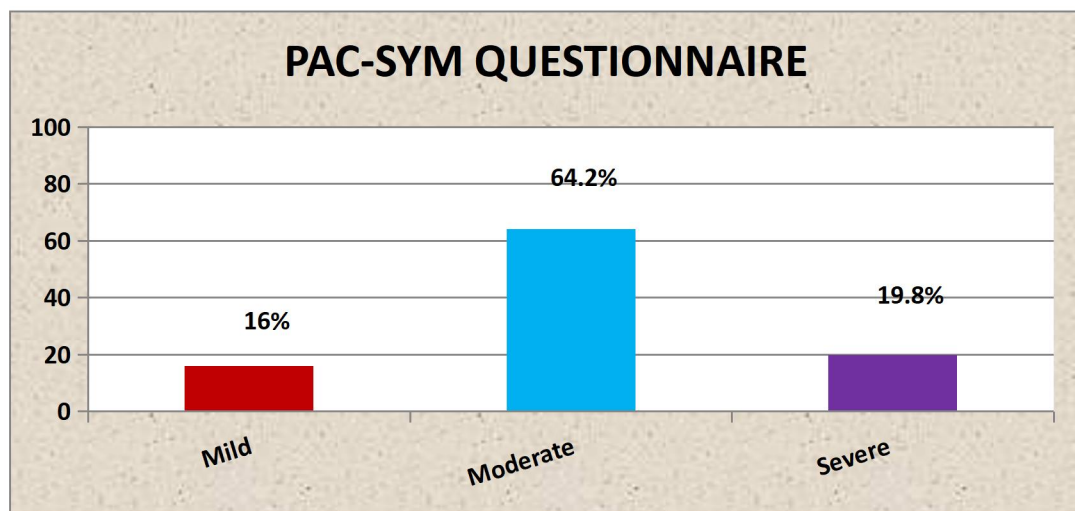


Figure (2): Distribution of The Studied Participants in Relation to Total Patient Assessment of Constipation (PAC-SYM) Questionnaire (n=187)

Table (2): Mean Score of the Studied Participants' Response to PSQI (n=187)

The PSQI	Mean ± SD
Component 1: Subjective Sleep Quality	1.70 ± 0.456
Component 2: Sleep Latency	2.04 ± 0.603
Component 3: Sleep Duration	2.39 ± 0.642
Component 4: Sleep Efficiency	2.01 ± 0.939
Component 5: Sleep Disturbance	1.34 ± 0.89
Component 6: Use of Sleep Medication	1.15 ± 1.01
Component 7: Daytime Dysfunction	1.60 ± 0.818
Global PQSI Score	12.22 ± 3.60

NS= not significant * p = ≤.05 (statistical significance) ** p = ≤.01 (highly statistical significance).

Table (3): Correlation Between the Bio-demographic Characteristics and PAC-SYM and PSQI among Studied Participants (n=187)

PSQI		PAC-SYM		Bio-demographic characteristics
<i>P</i>	<i>R</i>	<i>P</i>	<i>R</i>	
0.01*	0.186	0.001**	0.245	Age
0.003**	0.225	0.001**	0.235	Gender
0.001**	0.210	0.003**	0.214	BMI

NS= not significant * $p \leq 0.05$ (statistical significance) ** $p \leq 0.01$ (highly statistical significance).

Table (4): Correlation between Laboratory Investigation with PAC-SYM and PSQI among the Studied Participants (n=187)

Laboratory Investigation	PAC-SYM		PSQI	
	<i>R</i>	<i>P</i>	<i>r</i>	<i>P</i>
Creatinine	0.242	0.001**	0.201	0.006**
Urea	0.277	0.001**	0.378	0.001**
HB	0.147	0.044*	0.232	0.001**
K	0.330	0.001**	0.144	0.048*
Na	0.158	0.031**	0.521	0.001**

NS= not significant * $p \leq 0.05$ (statistical significance) ** $p \leq 0.01$ (highly statistical significance).

Table (5): Correlation Between Stages of CKD with PAC-SYM and PSQI among Studied Participants (n=187)

Variables	Stages of CKD	
	<i>R</i>	<i>P</i>
PAC-SYM	0.066	0.030*
PSQI	0.521	0.001**

NS= not significant * $p \leq 0.05$ (statistical significance) ** $p \leq 0.01$ (highly statistical significance).

Table (6): Correlation Between Severity of Constipation Symptoms and Poor Sleep Quality among Studied Participants (n=187)

Variables	PSQI	
	<i>r</i>	<i>p</i>
Presence Functional Constipation	0.224	(0.02**)
PAC-SYM	0.194	(0.008**)

NS= not significant * $p \leq 0.05$ (statistical significance) ** $p \leq 0.01$ (highly statistical significance).

Table (7): Correlation between Sleep Duration with CKD Stages and Severity of PAC-SYM among Studied Participants (n=187)

Variables	Sleep Duration	
	<i>R</i>	<i>P</i>
PAC-SYM	0.162	0.027*
Stages of CKD	0.178	0.015*

NS= not significant * $p \leq 0.05$ (statistical significance) ** $p \leq 0.01$ (highly statistical significance).

Discussion:

The current research findings displayed that more than thirty-three percent of the participants their ages were more than sixty

years old, this contributed to CKD is more likely to occur with advanced age due to aging process is linked strongly with changes in the basic structure and, function of the kidney as well as, multiple comorbidities. This consistent

with the findings of a research done by **Liu, et al., (2021)**, who discussed that, advanced age is more likely to have multiple comorbidities such as hypertension, diabetes, as well as, structural and functional changes in the kidney which increase the risk for CKD, in addition to, taking multiple medications, some of which could be toxic to the kidneys, and adopting unhealthy lifestyle as smoking, exercise, as well as poor diet, which could be contributed to the development of CKD. **Intriguingly**, the current study results revealed a statistically significant positive correlation between the age and increasing the severity of constipation symptoms (PAC-SYM), as well as poor sleep quality (PSQI). Such finding was in congruent with the finding of a research investigated by **Kang, et al., (2021)**, who described that, advanced age is strongly associated with reduced physical activity, slower gastrointestinal transit time, changes in appetite and taste, as well as lower intake of fiber-rich foods and water. Also advanced age linked with resaving multiple medications that could contribute to constipation, such as opioids, diuretics, moreover, weakened pelvic muscles, all these factors could be contribute to constipation. Interestingly, also, agreed with the findings of a study done by **Mc Carthy, (2021)**, who interpreted that, advanced age may experience changes in their circadian rhythm, having medical conditions as chronic pain, heart or respiratory disorders, that could interfere with sleep by causing frequent urination, increasing heart rate, or causing anxiety.

Regarding to gender; the results of the present research represented that more than sixty-six percent of the study's participants were females, which could be the cause of such condition due to the hormonal differences between male and female. The current study results were in coincide with, the finding of a study done by **Ahmed, Saad, & Dumanski, (2021)**, who mentioned that, estrogen have a protective effect on the kidneys, and postmenopausal women may be at a higher risk of CKD due to declining estrogen levels. Also, autoimmune diseases such as lupus and rheumatoid arthritis are more common in females, all these factors make females patient at more risk to develop CKD. Furthermore, the

actual current study findings highlighted that, there is a statistically significant positive connection between female gender with severe symptoms of constipation (PAC-SYM), and poor sleep quality (PSQI). Which could be rationalized as the females' patients are more susceptible to constipation due to hormonal fluctuations, and physiological differences, as well as psychological and societal norms. Meanwhile, the finding of a study done by **Liu, et al., (2021)**, who summarized that, the female are susceptible to constipation due to hormonal changed which slow down the peristaltic movement, and a decline in estrogen levels during menopause cause changes in the bowel habits, as well, anatomical structural of the pelvic floor, which could cause inadequate muscle coordination during bowel movements. Also, psychological stress and environmental factors play an important role in such condition.

The current study declared that the highest percentages of participants were hypertensive. From the researchers' practical application standpoint, both hypertension and CKD, are linked to each other. Also, the finding of a study done by **Pugh, Gallacher, & Dhaun, (2019)**, reported that, CKD could cause hypertension through a complex interplay of factors. When the kidneys are damaged, they release renin hormones which raise blood pressure. In addition, CKD could lead to an increase in fluid volume in the body, which can also contribute to hypertension. Furthermore, hypertension and CKD could exacerbate each other, creating a vicious cycle. High blood pressure could worsen kidney function, which in turn can lead to high blood pressure levels. This could ultimately lead to end-stage renal disease (ESRD).

In respect to medication, current findings displayed that more than three quarter of the study sample received more than one drug as CKD treatment. This finding was in the line with a study done by **Ikee, Yano, & Tsuru, (2019)**, who suggested that, participants with CKD received a large number of medications, such as analgesics, opioids anticholinergic agents, calcium supplement, calcium channel blockers, diuretics, iron supplement, serotonin receptor blockers, potassium-binding resins, antihypertensive

agents, antidepressants agents, and others, all these drugs could cause constipation and sleep disturbance. So, it is difficult to identify the causal agent, however, it is necessary to reduce the drug potentially inducing constipation.

Concerning to laxatives, the current study found that more than three quarter of the study sample received laxatives, which agreed with the finding of a study done by **Sumida, et al., (2021)**, who reported that, prevalence of constipation is higher among patients with CKD, due to dietary and fluid restrictions, comorbidities, sleep disorders, concomitant medications and altered gut microbiota. So, lifestyle modifications as increasing fiber supplements, exercise which may not be practiced or impacted, and laxative are often needed for treating of constipation.

Regarding to BMI, the study current findings revealed that near to fifty-percent of the studied participants were overweight. From the perspective of the researcher, CKD patients are more susceptible to overweight and obesity due to pharmacological agent, limited physical activity related to hospitalization and sense of fatigue, as well as, fluid restrictions, rising level of uremic toxins, alteration in microbiota activity and psychological stress which was validated by the finding of a study done by **Navaneethan, et al., (2016)**, who demonstrated that more than two-thirds of CKD patients are either overweight or obese. In the general population, obesity is a separate risk indicator for the development of renal disease. Moreover, the finding of a study done by **Silveira, et al., (2021)**, who interpreted that, overweight and obese people had various other risk factors for constipation, including sedentary lifestyles, poor dietary quality, and a general lack of ingestion of fiber and vegetables.

Focusing on Rome IV diagnostic criteria for functional constipation (FC), the present study results clarified that about two thirds of the research participants suffer from non-functional constipation. From the researchers' point of view; CKD pathogenesis is more complex and multifactorial, with subsequent accumulation of uremic toxins, dietary restriction of fiber-rich foods, restrictions of fluid intake, limited mobility and

multiple drugs used, all these factors increase risk of non-functional constipation. Additionally, poor sleep quality increase incidence of non-functional constipation. This finding consistent with the finding of a study done by **Sharma et al., (2021)**, who found that constipation measured by Rome IV criteria estimated around two third of the studied patients, and added that, CKD and sleep deficiency is connected with disorders of gut-brain interaction as chronic constipation.

Regarding, the correlation between Stages of CKD with PAC-SYM and PSQI, the current research results demonstrated that, there is a connection in which there is statistically significant in progression of CKD stages with increasing severity of constipation symptoms (PAC-SYM), and poor sleep quality. The possible interpretations could be that the poor sleep quality are common among patients with progressed CKD stages due to refractory pruritus or restless leg syndrome which interfere with sleeping pattern, in addition the changes of the gut microbiota is connected to the pathogenesis of many diseases especially CKD. These results were agreed with the finding of a study done by **Lu, et al., (2019)**; **Sumida, et al., (2017)**, who explained that individuals with mild, moderate, or severe constipation had a greater risk of progressive reduction in estimated glomerular filtration rate (eGFR) than individuals without constipation. The gut environment could undergo major quantitative and qualitative changes as a result of CKD, which may therefore have an impact on the pathophysiology of the disease's course and a number of its consequences. Additionally these finding were parallel with the finding of a study done by **Rehman, et al., (2019)**, who captured that all stages of CKD, notably those with stage 5 CKD-Non Dialysis, exhibited poor sleep quality due to sympathovagal imbalance, and the level of body's physiological orexin among patients with CKD reaches unnatural levels due to the raising periods of wakefulness that could be connect with poor sleep quality. Furthermore, the finding of a study done by **Ruszkowski, et al., (2021)**, who demonstrated that, poor sleep habits increased the risk of CKD by around 2.59 times. In addition, the finding of a study done by **Ikee, Yano, & Tsuru, (2019)**, who discussed that, uremic

toxins from the intestines trigger pro-inflammatory reactions and oxidative stress, which may affect gut epithelial integrity leading to constipation among patients with CKD.

Regarding, the correlation between laboratory investigations with PAC-SYM and PSQI, the current research results demonstrated that, statistically substantial positive association is existing between the high laboratory investigations with increasing severity of constipation symptoms (PAC-SYM), and poor sleep quality. Such finding is in congruent with, the finding of a study done by **Kim, et al., (2021) & Li, et al., (2020)**, who relied on CKD a state where the kidneys gradually deteriorated over time, leading to a waste products accumulation such as creatinine and urea in the blood. Elevated levels of these substances decrease kidney function. As hemoglobin, potassium and sodium play important roles regarding the function of the muscles, nerves, and other tissues, so these electrolytes will be elevated due to the changes that occur in the intestinal transit time and bacterial metabolism of electrolytes in the gut. Another research published in the Journal of Renal Nutrition, a study performed by **Ozdemir, et al., (2021)**, included 272 patients with stages 3-5 CKD (2021), who found that patients with constipation had higher mean serum creatinine, urea, and potassium levels compared to those free of constipation, additionally, constipation was associated with lower mean hemoglobin levels. In the same direction the finding of a study done by **Wang, et al., (2021)**, who displayed that, sleep disturbance was connected with the high levels of serum creatinine and higher rates of anemia among patients with CKD. The authors discussed that this relation could be due to increase the sympathetic nervous system activity and decreased renal blood flow during sleep disturbance, which leading to decreased kidney function and increased creatinine levels. Also, the finding of a study done by **Kim, et al., (2021)**, who added that, the higher levels of serum urea due to changes in protein intake or metabolism in poor sleep quality is associated with increased urea production.

With respect to, the correlation between sleep duration with stages of CKD and PAC-SYM, the findings of the current research sheds light on a statistically significant positive connection were present between short sleep duration with severe PAC-SYM and progression of CKD stages among the study participants. Possible interpretations could explain that, sleeping deprivation and deficiency increase the endothelial dysfunction, which subsequently affect kidney functions, as well as Kidney-gut in a multi-cycle that harm the kidney functions, causing constipation. Also, the finding of a study done by **Yang, et al., (2021)**, who reflects that insufficient sleep could affect gastrointestinal physiology in several ways; firstly, it can disrupt circadian rhythms, leading to increased motility of colonic as well as contraction during the sleep. Secondly, insufficient sleep can alter the rapid eye movement sleep phase, which is linked to abnormal bowel transit and changes in specific proteins in the colon and ileum, causing increased susceptibility to constipation through modifying inflammatory marker levels, emerging evidence indicated that short duration of sleep enhances the incidence of constipation. Furthermore, the finding of a study done by **Lu, et al., (2019)**, who confirmed that, gut microbiota and human being had a mutualistic relation called symbiosis, but chronic disease could disrupt this balance due to factors like fluid overload, uremic toxin accumulation, and decreased consumption of dietary fibers. Gut microbiota can create compounds for uremia retention that accumulate in patients with CKD, leading to chronic inflammation, increased cardiovascular mortality and CKD progression. CKD is linked to fluid overload with intestinal wall edema, uremic toxin buildup, reduced consumption of dietary fiber, utilize of oral phosphate binders, also the use of oral iron, which subsequently increase progress of CKD

Limitation of the study:

We can't completely rule anything out of other uncontrolled confounders lifestyle as (nutrition, smoking, drinking of alcohol and physical activity) that affecting the coexisting connection between constipation as well as sleep quality in CKD. In addition, the research sample were collected from a single –center

using a cross-sectional design, so this cannot be a representative sample.

Conclusion

The results of the current study concluded that nearly more than fifty-percent of the studied participants had functional and moderate symptoms of constipation as well as the majority of them were poor sleepers according to Pittsburgh Sleep Quality Index (PSQI). Interestingly, there was a highly statistical correlation between constipation and sleep quality among patients with CKD.

Recommendation

- Further studies are required to spot on the nature of the coexisting connection between constipation and sleep quality among patients with CKD.
- Longitudinal studies to explore changes in symptoms among patients with CKD over time are urgently needed.
- Future research regarding epidemiology and prognosis of constipation and sleep quality to evaluate the most effective and safe profiles of different therapeutic techniques for managing constipation and sleep disorders, and analysis their potential advantages on subsequent results of CKD.
- Highlights the importance of addressing constipation as part of the management of disturbance sleep among patients with CKD.

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